

Project Presentations

April 25

1 Overview

For our last lab (**April 25**), each of you will give a presentation of an astronomy topic of your choice. I have provided a list of suggested topics here, but you are welcome to come up with a topic of your own. All topics must be approved by me by **April 11**, and no two topics may be the same, so they will be approved on a first-come, first-serve basis. This is your opportunity to explore something that intrigues *you* about astronomy and share that with me and your classmates, so have fun with your presentations! Class on April 18th is dedicated to preparation. I'm also available by email or appointment if you would like to get feedback or do a dry-run of your talk.

2 Guidelines

Preparation

- You should submit the list of research papers, popular articles, websites, books, chapters you referred to by **5 PM on April 24**, along with your slides. You should include references in your presentation that you used at appropriate locations. No special formatting or citation style is needed
- Keep in mind that it is often more compelling to discuss a few sub-topics that you know well, versus putting lots of content that is glossed over/simply read off your slides

Presentations

- Presentations should be **10-15 minutes in length**
- Each presentation will be followed by a **5 minute question period**
- You may use any combination of slides and/or whiteboard
- Everyone should answer the following questions for each talk; your feedback will be given to the presenter. Printed forms will be provided on the day of the presentation.
 - What's one thing you learned and/or enjoyed?
 - What's one strength of the presentation that aided clarity, engagement?
 - If you were to give the same talk, what would you change to convey the ideas more clearly?
- Come ready to ask questions during and after each talk; these will count for participation. Any kind: E.g., "I didn't understand your sentence just now, as it is contradictory with

previous statement”, asking for more information, hypothetical questions based on relevant scenarios, etc. will count. More thought-out the questions are better. But, we believe that no question is a bad question.

Grading

15% of your final grade – 10% for the presentations, and 5% for your participation. Here is a rubric¹ for your presentation.

Content: 70%

- (35%) Presenter introduces and describe(s) topic at level appropriate to this class [___]
- (40%) Presenter explains extent of and limitations on our knowledge on the topic, including data/observations underlying knowledge [___]
- (20%) Presenter provides context by drawing connections to, e.g., different areas of astronomy, concepts from lab or lecture, other areas of science, areas outside of science, etc. [___]
- (5%) Presenter chooses and cites appropriate references (i.e., goes beyond Wikipedia and popular press releases). Presenter submits reference list. [___]

Delivery: 30%

- (35%) Presentation has a logical flow that audience can follow [___]
- (25%) Presenter can address reasonable audience questions [___]
- (20%) Presentation aids (slides or board-work) are understood by audience [___]
- (10%) Presenter stays within allotted time [___]
- (10%) Presenter speaks clearly, and keeps the audience engaged (questions, activities, etc.) [___]

[___] = easily and concisely (4), sufficiently (3), is somewhat able to (2), barely to did not (1)

¹Chiefly adapted from the American Astronomical Society—Chambliss award rubric.

3 Suggested topics

Please submit your proposed topics by **10 PM on April 11th**.

A non-comprehensive list of suggested topics follows. You can choose something not listed, so long as it's within the realm of stars, galaxies, cosmology, and related topics relevant to our lab's focus area. It should be something you haven't covered in depth in class or this lab.

I recommend you go one step deeper for most of the below suggestions.

Good topic: "The Great Red Spot and other storms, vortices, and zonal flows on Jupiter".

Not-as-good topic: "Gas giant atmospheres". This will help both you and me determine whether your topic is well-suited for a 10–15 min presentation.

- Galaxies (including our own)
 - Supermassive black hole and galactic dynamics (birth, growth, rotation, etc.)
 - Different theories of dark matter
 - Intergalactic medium
 - Galactic halo, and dark matter content of different galaxies
 - Dark energy
- Stars (including Sun)
 - Interior structure, chemistry and phase composition
 - Asteroseismology (aka starquakes!)
 - Surface properties, and stellar atmospheres, and magnetospheres
 - The process of star formation, and star forming regions in galaxies
 - Binary star systems
 - Specific types of star (Wolf-Rayet, T-Tauri, RR Lyrae, Population III aka the first stars)
- Planets
 - Solar system formation and history
 - Proto-planetary disks
 - Planet and planetesimal formation
 - Brown dwarves
 - Exoplanets: Types, detection methods, atmosphere, future missions, etc.
 - Are we alone?
- Telescopes and spacecraft
 - Ground- versus space-based telescopes
 - Specific missions/projects: Hubble, James Webb Space Telescope, Kepler, Very-long-baseline interferometry, Rossi X-ray Timing Explorer (RXTE), Large Synoptic Survey Telescope, Chandra (or your other favorite choice).
 - NASA budget, mission, proposals. How funding decisions are made.
- Spacefaring; Search for Extraterrestrial Intelligence (SETI)
 - Astrobiology, chemistry; the habitable zone

- Speciation and extinctions on Earth
- Energy usage, Dyson spheres
- Communication and signal detection; candidate SETI signals
- Space travel; Breakthrough Starshot
- Miscellaneous
 - Gravitational waves and LIGO
 - Compact objects (Black hole, neutron stars, white dwarf)
 - Mysterious signals (Fast Radio Bursts, Gamma Ray Bursts)
 - Big bang, and the acceleration of Universe (inflation, nucleosynthesis, final fate, etc.)
 - Clusters (of stars and galaxies)
 - Present any scientific paper. I recommend looking at <https://arxiv.org/archive/astro-ph> to choose your favorite field within astronomy. Then go through some of the papers' titles to narrow down to a paper of your liking.
 - Biographical study of a famous astronomer or planetary scientist. If you do this, choose at least one scientific contribution to emphasize.
 - * Galileo, Kepler, etc.
 - * Caroline Herschel (comets)
 - * Annie Maunder (sunspots, solar corona, eclipses)
 - * Annie Jump Cannon (spectra of stars)
 - * Cecilia Payne-Gaposchkin (the composition of stars)
 - * Vera Rubin (dark matter)
 - * David Jewitt (trans-Neptunian objects, comets)
 - * Margaret Kivelson (solar wind, Europa's ocean)
 - * Carl Sagan (science communication; solar system, astrobiology)
 - * Jill Tarter (SETI)
 - * Sara Seager (exoplanets)